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The structure of fines in the light of political competition[*]

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Abstract

This paper analyzes the determinants of public law enforcement policies when citizens vote for the timing and level of fines. We consider situations where citizens and politicians disagree on the value of the expected social harm associated with some activities. We find that citizens vote for act-based (harm-based) sanctions when they expect that social harm is low (resp high). On the other hand, we show that the equilibrium fines may be higher or lower than the optimal one, depending on the difference between politicians and citizens' expectations.

Keywords : timing of sanction, law enforcement, deterrence, political competition, majority rule.

JEL classification codes : D72, D73, H1, K14, K23, K32, K4, Q52, Q53, Q58.

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1 Introduction

Public law enforcement (Becker, 1968; Polinsky and Shavell, 2000) focuses on the control of activities imposing external costs to society, such as criminal acts, environmental pollution, speeding on a highway. A public authority sets a fine, given general enforcement efforts (i.e. a given probability of detecting and convicting any kind of wrongful act), in order to induce optimal deterrence.[1] The issue of the timing of sanction arises when the external cost is uncertain rather than certain. Should the fine be applied when the activity is detected (act-based) or when the external cost is (harm-based)? Polinsky and Shavell (2000) show that, for a given and equal probability of detection, the social planer should be indifferent between act and harm based sanctions, even when citizens and the authority disagree about the probability of harm.[2] Furthermore, the level of deterrence is the same for both regimes, and determined only by the authority's estimation of the expected harm.

A crucial aspect is that most of the law enforcement literature issuing from Becker's seminal article assumes a benevolent law enforcer, which chooses according to a social welfare function aggregating both the preferences of law abiding citizens and offenders. This important methodological issue has been early debated both by lawyers and economists,[3] although no convincing solution has been provided up to now.[4] More astonishing, the debate in the *Law & Economics* literature regarding the objectives of the law has focused on the issue of efficiency *vs* fairness,[5] in a sense ignoring to a large extent the more general debate in Social Choice theory initiated after the seminal work of Arrow (1951).

From this point of view, our paper is the first attempt (as far as we know) to analyze formally the issue of the deterrence of wrongful acts under political influences. We introduce here a simple model of electoral competition in a public law enforcement setting where the harm is uncertain, in order to characterize the structure of penal sanctions. In the vein of the framework known as *Dowsian electoral competition* (see Persson and Tabellini, 2000), we assume that citizens vote for an enforcement policy based on a specific timing of sanction (act based vs harm based) and a level of fines. We provide a formal analysis

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[1] Example are numerous. This authority can be an agency, the State, a local government. A mayor decides of the level of parking fines in her town. An environmental agency checks firms' compliance to environmental regulation. The legislative process determines the maximal fines an offender faces, according to the offense's gravity.

[2] Polinsky and Shavell (2000) have highlighted factors such as limited assets, risk aversion, risk information which are relevant to the choice between act based and harm based sanctions. In the simple framework however, optimal deterrence can be achieved under both regimes. See also Garoupa and Obidzinski (2010).

[3] Since Stigler (1970), the introduction of illegal gains in the social value function is a controversial issue. Both the signifiance and the objective of the penal code are still in debate among scholars; see Dau-Schmidt (1990) and Lewin and Trumbull (1990).

[4] See Langlais (2011). Some authors suggest simply that criminals'utility must be weighted; see Garoupa (1997).

[5] See Dari-Mattiacci and Garoupa (2007), Fleurbaey, Tungodden and Chang (2003) and Kaplow and Shavell (2001).

of the structure of sanctions associated with the equilibrium emerging under political competition, and compare its effects to those of the optimal one.

The paper is organized as follows. Section 2 introduces the basic model and notations, and briefly reminds the case of a benevolent enforcer. Section 3 analyzes the timing of sanction (act-based *versus* harm-based sanction) that emerges at equilibrium under electoral competition. Section 4 concludes.

2   The basic model

We rely on the usual model of law enforcement *à la* Becker, assuming a disagreement exists between the population and the public enforcer regarding the assessment of the expected external cost associated with offenses.

2.1   General assumptions

Let us consider the case where the illegal activity allows the (risk neutral) criminal to obtain a benefit equal to b, while an honest citizen earns an income normalized to 0; b will be called the type of the criminal. Public authorities do not observe the type b, and only know that b follows a uniform distribution function on $[0, B]$. The (external) loss/harm to the rest of the society is h in case of crime, whatever the private benefit for the criminal.

The citizens and the public authority do not agree on the probability of occurrence of h; for the former, the likelihood of h is denoted as $\sigma_e \in (0, 1)$, while $\sigma_g \in (0, 1)$ is for the government. We require the following assumption:

Assumption 1: $B > \max\{\sigma_g, \sigma_e\} \times h$.

One of the main consequence of this assumption is that it does not matter (see Kaplow (1992) for this discussion) whether acts are definitively undesirable ($h > B$) or not ($h < B$).

Monitoring the criminal activity entails a cost for public authorities, equal to $m(p)$, where for the sake of simplicity p is the probability of control (encompassing arrest, conviction and punishment for an illegal behavior). As is usual in the literature, we assume that this cost is financed through a lump sum tax t plus the expected fine levied on the fraction of the population which is seen as criminal (either for whom the harmful activity entails the harm, or is not deterred from committing the crime). However, we assume general enforcement expenditures, such that p is exogenously set throughout in the text.

We focus here on punishment, *i.e.* the choice of a monetary sanction (penalty or fine) $f > 0$. We assume that the management costs associated with the monetary penalty are negligible. We also assume that the maximal fine is the legal wealth of the population, i.e. $f \in [0, w]$, assuming $w > \max\{\sigma_e, \sigma_g\} \times \frac{h}{p}$.

We assume that the cost a crime imposes to the society is defined as a externality term affecting individuals' utility level, with a very simple formulation: $E = -\sigma_e q h$, where $q \in (0, 1)$ is the probability of crime. As usual in the

literature on crime enforcement, we will show that $q = \Pr(b \geq \tilde{b})$, with $\tilde{b}$ denoting the deterrence threshold (to be more specifically defined therein). Hence

$$q = \int_{\tilde{b}}^{B} \tfrac{1}{B} db = \left(1 - \tfrac{\tilde{b}}{B}\right).$$

2.2   Act-based sanctions

For simplicity, let us denote the individual who abides the law the "honest" people, and those who violates the law the "criminals".

Under the act-based regime, let us denote the utility level of a criminal as:

$$u_c^a = w + b - t - pf - \left(1 - \frac{\hat{b}^a}{B}\right)\sigma_e h$$

where $\hat{b}^a$ is for the level of deterrence, while for an honest individual, we have:

$$u_h^a = w - t - \left(1 - \frac{\hat{b}^a}{B}\right)\sigma_e h$$

Hence as usual, $\hat{b}^a$ is defined by $u_c^a = u_h^a$; under the act-based regime, a potential criminal decides to undertake the activity if the benefit he retrieves from doing so is higher that the expected punishment, i.e. if $b \geq pf = \hat{b}^a$.

Regarding the behavior of the public enforcer, the public budget constraint writes in this case:

$$m(p) = t + \left(1 - \frac{\hat{b}^a}{B}\right)pf \tag{1}$$

We consider here only balanced-budget policies.

2.3   Harm-based sanctions

Under the harm-based regime, the utility level of a criminal is:

$$u_c^h = w + b - t - \sigma_e pf - \left(1 - \frac{\hat{b}^h}{B}\right)\sigma_e h$$

where $\hat{b}^h$ is the level of deterrence, while for an honest individual, we have:

$$u_h^h = w - t - \left(1 - \frac{\hat{b}^h}{B}\right)\sigma_e h$$

Using the condition $u_c^h = u_h^h$, we obtain a deterrence level equal to $\hat{b}^h = p\sigma_e f$. The budget constraint of the enforcer writes now as:

$$m(p) = t + \left(1 - \frac{\hat{b}^h}{B}\right) \sigma_g p f \tag{2}$$

2.4 Optimal timing of sanctions

When the policy maker acts as a benevolent planner, the social welfare function under an act-based sanction writes as:[6]

$$S^a = w - m(p) + \frac{1}{B} \int_{pf}^{B} (b - \sigma_g h) db \tag{3}$$

The integral term in S^a corresponds to the expected private benefit net of the external cost associated with the illegal activity. The other terms (exogenous here) are the citizens wealth net of the cost of monitoring for public authorities. It comes that the optimal sanction is: $f_u^a = \frac{\sigma_g}{p} h$. The rate of crime is $q_u^a = 1 - \frac{p f_u^a}{B} = 1 - \frac{\sigma_g}{B} h$.

Under a harm-based sanction, the enforcer has to choose a fine f in order to maximize:

$$S^h = w - m(p) + \frac{1}{B} \int_{\sigma_e pf}^{B} (b - \sigma_g h) db \tag{4}$$

Then solving for the optimal sanction yields $f_u^h = \frac{\sigma_g}{\sigma_e} \frac{h}{p}$, and the rate of crime is $q_u^h = 1 - \frac{\sigma_e p f_u^h}{B} = q_u^a$.

Thus, despite a higher level of the fine in the harm–based regime, both achieve the same level of deterrence determined by the expected sanction $\sigma_g h$, which only reflects the beliefs of the authority on the occurrence of harm. Thus it makes no difference in terms of social welfare that law enforcement policies rely on act-based rather than harm-based sanctions: $S^a = S^h$ (Polinsky and Shavell, 2000; Garoupa and Obidzinski, 2010).

Remarks. It is obvious that $f_u^a < f_u^h$. The comparative statics of the optimal sanctions are worth to notice. On the one hand, the act-based sanction f_u^a is increasing in σ_g and does not depend on σ_e; on the other hand, the harm-based sanction f_u^h is increasing in σ_g / σ_e.

3 Electoral competition

Assume now that citizens vote for the law enforcement policy. To simplify, assume there exist two candidates $i = 1, 2$, representative of two political parties,

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[6] Our approach is in line with Garoupa and Obidzinski (2010), and the ex post view of the utilitarian approach, meaning that the planner uses its belief σ_g rather than citizens' belief σ_e in order to assess social welfare.

competing for national (presidential or legislative) or local (municipal) elections.[7] A programme or *electoral platform* (R, f) consists in a regime of sanction R and a fine f. We consider for obvious reasons that their exist only two regimes of sanction – the harm-based regime, R^h, or the act-based regime, R^a. Regarding the monetary sanction, we still assume that the maximal fine is the legal wealth of the population w. A candidate proposes to electors an electoral platform that will indeed maximize his chance to win the elections. We consider the (simple) majority rule for voting. All citizens are electors and do participate: each voter simply votes for the candidate whose platform allows him to reach the highest utility level, and in case where he is indifferent, he tosses a coin to decide for whom he votes.[8]

The timing of the electoral competition game between the candidates and the citizens/voters is as follows: after that Nature moves at stage 0 (choosing the type of citizens, not observable for politicians), the electoral competition begins at stage 1, which is a simultaneous move (non cooperative) game between the candidates, where they both choose and announce their platforms, both satisfying the associated balanced budget constraint; at stage 2, elections take place, and citizens simultaneously choose between the two candidates; at stage 3, the elected candidate implements his policy[9] – it becomes a law; at stage 4, citizens choose to abide or not the law; at stage 5, the law is enforced.

3.1 Equilibrium timing

We denote as f_h^i (f_c^i) the choice of sanction by the honest (respectively, criminal) population in regime R^i, $i = a, h$.

Proposition 1 *When $\sigma_e \neq \sigma_g$ and $\sigma_e h \neq \frac{B}{2}$, the unique symmetric equilibrium has the following features:*[10]

i) Assume $\sigma_e h > \frac{B}{2}$; then:

- If $\sigma_e - \sigma_g > 0$, both candidates announce (R^h, f_h^h) where $f_h^h = \frac{1}{2}\left[\frac{\sigma_e}{\sigma_g}\frac{h}{p} + \frac{B}{p\sigma_e}\right]$;
and the rate of crime is $q_h^h = \frac{1}{2}\left[1 - \frac{\sigma_e^2}{\sigma_g B}h\right]$.

- If $\sigma_e - \sigma_g < 0$, both candidates announce (R^a, f_h^a) where $f_h^a = \frac{1}{2}\left[\frac{\sigma_e}{p}h + \frac{B}{p}\right]$;
and the rate of crime is $q_h^a = \frac{1}{2}\left[1 - \frac{\sigma_e}{B}h\right]$.

ii) Assume $\sigma_e h < \frac{B}{2}$; then:

- If $\sigma_e - \sigma_g > 0$, both candidates announce (R^h, f_c^h) where $f_c^h = \frac{1}{2}\left[\frac{\sigma_e}{\sigma_g}\frac{h}{p} + \left(\frac{\sigma_g - \sigma_e}{\sigma_g}\right)\frac{B}{p\sigma_e}\right]$;
and the rate of crime is $q_c^h = \frac{1}{2}\left[1 + \frac{\sigma_e}{\sigma_g}\left(1 - \frac{\sigma_e}{B}h\right)\right]$.

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[7] Competing for elections here is like a rent seeking contest, an exogenous rent being obtained in case of victory is attached to holding offices, ministries and so on.

[8] When both candidates obtain half of the voters, the winner is chosen tossing a coin.

[9] i.e., we assume that candidates commit to their own electoral platforms.

[10] When $\sigma_g = \sigma_e$ or $\sigma_e h = \frac{B}{2}$, a multiplicity of equilibria (symmetric and asymmetric) arises. We let this aside.

- If $\sigma_e - \sigma_g < 0$, both candidates announce (R^a, f_c^a) where $f_c^a = \frac{1}{2}\frac{\sigma_e}{p}h$; and the rate of crime is $q_c^a = 1 - \frac{1}{2}\frac{\sigma_e}{B}h$.

The proof is available on request[11].

Remarks. The comparative statics are in a sense the dual of those found for the optimal sanctions. On the one hand, a act-based sanction is increasing in σ_e and does not depend on σ_g; on the other hand, a harm-based sanction is increasing in σ_e/σ_g. It is also easy to see that $f_h^a > f_c^a$ and $f_h^h > f_c^h$, meaning that if $\sigma_e h > \frac{B}{2}$, a strong enforcement equilibrium emerges with a high sanction (f_h^a or f_h^h); while if $\sigma_e h < \frac{B}{2}$, a weak enforcement equilibrium emerges with a low sanction (f_c^a or f_c^h).

Under political competition, the characteristic features of the equilibrium depend on the sign of $(\sigma_g - \sigma_e)$ and $\left(\sigma_e h - \frac{B}{2}\right)$. Let us consider first the case where citizens expect that crime yields a large external loss, $\sigma_e h > \frac{B}{2}$. In this case, the majority is composed of citizens who will abide the law, and vote for a large sanction. However, two alternative equilibria may emerge. If citizens' assessment of the probability of harm is larger than politicians' one, $\sigma_e > \sigma_g$, the prevailing equilibrium is associated with harm-based sanction; in contrast, if $\sigma_e < \sigma_g$, then the act-based sanction arises at equilibrium. Now when citizens expect that crime yields a small external loss, $\sigma_e h < \frac{B}{2}$, the majority is composed of citizens who will not abide the law, and vote for a low sanction. However the circumstances under which the ham-based (act-based) sanction arises at equilibrium are similar to those found before.

Thus whatever the regime of sanctions, it may be associated with a high level of punishment (strong enforcement), or a low one (weak enforcement). Nevertheless, it can be verified that when $\sigma_e > (<)\sigma_g$, we have $\sigma_e p f_h^h > (<)p f_h^a$ as well as $\sigma_e p f_c^h > (<)p f_c^a$: in words, political competition allows that the regime of sanctions for which citizens vote yields the highest level of deterrence at equilibrium.

3.2   Equilibria and optimum

The next propositions discuss more accurately the inefficiencies associated with an electoral equilibrium. First, we compare the properties of a strong enforcement equilibrium to the optimum:

Proposition 2 *Consider the strong enforcement equilibria.*
A/ i) If $\frac{B}{2} + \left(\frac{\sigma_e}{2} - \sigma_g\right) h > 0$, the act-based sanction is larger than the social welfare maximizing one, and the rate of crime is smaller (i.e. $f_h^a > f_u^a$ and $q_h^a < q_u^a$); ii) if $\frac{B}{2} + \left(\frac{\sigma_e}{2} - \sigma_g\right) h < 0$, the act-based sanction is smaller than the

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[11]See also the extended draft, Langlais and Obidzinski (2014).

social welfare maximizing one, and the rate of crime is larger (i.e. $f_h^a < f_u^a$ and $q_h^a > q_u^a$).

B/ The harm-based sanction is larger than the social welfare maximizing one, and the rate of crime is smaller (i.e. $f_h^h > f_u^h$ and $q_h^h < q_u^h$.

Proof. A/ The conditions under which f_h^a is enforced imply that $\sigma_g h > \sigma_e h > \frac{B}{2}$; on the other hand, we have:

$$f_h^a - f_u^a = \frac{1}{p} \left(\frac{B}{2} + \left(\frac{\sigma_e}{2} - \sigma_g \right) h \right) = \frac{1}{2p} \left((B - \sigma_g h) + (\sigma_e - \sigma_g) h \right)$$

which has an ambiguous sign, since the first term is positive (by assumption 1), and $\sigma_e - \sigma_g < 0$. Note also that the rate of crime is defined as $q = 1 - \frac{pf}{B}$; thus $q_u^a - q_h^a$ has a sign opposite to $f_u^a - f_h^a$. Hence the results i) and ii).

B/ The conditions under which f_h^h is enforced imply that $\sigma_g < \sigma_e$ and $\sigma_e h > \frac{B}{2}$; we have now:

$$f_h^h - f_u^h = \frac{1}{p\sigma_e} \left(\frac{B}{2} + \left(\frac{\sigma_e^2}{2} - \sigma_g^2 \right) \frac{h}{\sigma_g} \right) = \frac{1}{2p\sigma_e} \left((B - \sigma_g h) + (\sigma_e^2 - \sigma_g^2) \frac{h}{\sigma_g} \right) > 0$$

given assumption 1. Note once more that the rate of crime is defined as $q = 1 - \frac{p\sigma_e f}{B}$; hence $q_u^h - q_h^h$ has a sign opposite to $f_u^h - f_h^h$. Hence the result. ∎

In the harm-based regime, a strong enforcement equilibrium is associated with a sanction larger than the optimal one. In contrast, under the act-based regime it depends roughly speaking, on whether the difference between citizens and politicians assessment of the external cost of crime is large or small enough. When σ_g is close enough to σ_e, then $f_h^a - f_u^a$ tends to $(B - \sigma_g h)$ which is positive - thus $f_h^a - f_u^a > 0$. However, when σ_g increases, the likelihood that $f_h^a - f_u^a < 0$ also increases.

Then, we compare the properties of a weak enforcement equilibrium to the utilitarian contract:

Proposition 3 *Consider the weak enforcement equilibria.*

A/ The act-based sanction is smaller than the welfare maximizing one, and the rate of crime is higher (i.e. $f_c^a < f_u^a$ and $q_c^a > q_u^a$).

B/ i) If $\frac{B}{2} (\sigma_g - \sigma_e) + \left(\frac{\sigma_e^2}{2} - \sigma_g^2 \right) h > 0$, the harm-based sanction is larger than the social welfare maximizing one, and the rate of crime is smaller ($f_c^h > f_u^h$ and $q_c^h < q_u^h$); ii) If $\frac{B}{2} (\sigma_g - \sigma_e) + \left(\frac{\sigma_e^2}{2} - \sigma_g^2 \right) h < 0$, the harm-based sanction is smaller than the social welfare maximizing one, and the rate of crime is larger ($f_c^h < f_u^h$ and $q_c^h > q_u^h$).

Proof. A/ Given the conditions under which f_c^a is enforced (since $\sigma_g > \sigma_e$), it comes:

$$f_c^a - f_u^a = \frac{h}{p}\left(\frac{\sigma_e}{2} - \sigma_g\right) < 0$$

B/ The conditions under which f_c^h is enforced imply $\sigma_g h < \sigma_e h < \frac{B}{2}$; we obtain:

$$
\begin{aligned}
f_c^h - f_u^h &= \frac{1}{p\sigma_e\sigma_g}\left(\frac{B}{2}\left(\sigma_g - \sigma_e\right) + \left(\frac{\sigma_e^2}{2} - \sigma_g^2\right)h\right) \\
&= \frac{1}{2p\sigma_e\sigma_g}\left[\left(B\left(\sigma_g - \sigma_e\right) - \sigma_g^2 h\right) + \left(\sigma_e^2 - \sigma_g^2\right)h\right]
\end{aligned}
$$

since under the condition $\sigma_g - \sigma_e < 0$, the first term is negative whereas the second is positive. Hence the results. ∎

Thus, in a weak enforcement equilibrium, the act-based sanction is always smaller than the optimal one, whereas the harm-based sanction may be lower as well as larger. Once more, it depends roughly speaking, on whether the difference between citizens and politicians assessment of the external cost of crime is large or small enough. When σ_e is close enough to σ_g, then $f_c^h - f_u^h$ tends to $\left(-\sigma_g^2 h\right)$ which is negative - thus $f_c^h - f_u^h < 0$. However, when σ_e increases, the likelihood that $f_c^h - f_u^h > 0$ also increases.

4   Concluding remarks

This paper is a first attempt to introduce some political inputs in a law enforcement analysis. Although a utilitarian enforcer is indifferent to the timing of sanctions, we show that this does not hold in a model of downsian electoral competition. We analyze the circumstances under which citizens vote between act based and harm based sanctions, and characterize the associated inefficiencies. Interesting enough, our point rejoins a discussion found in classical textbooks touching to the timing of sanctions. The informal argument is related to the quality of information at the disposal of the public agent: the higher the quality of information held by the state relative to the knowledge of citizens themselves, the more attractive will be legal sanctions focused at the early stages of private decisions, and vice versa.[12] To explain when act versus harm based sanctions emerge, this paper takes the slightly different view that citizens and public agents may hold different information and assess different beliefs regarding the consequences of dangerous acts. This is relevant both in a regulatory context (think of new although unknown risks, such as related to innovation and R&D) and a criminal one (think of the depenalization of some

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[12] See for example Bowles, Faure and Garoupa, 2008 ; Shavell, 2005 ; Van der Bergh and Visscher, 2008. We remind that in contrast, the formal literature proves that act and harm based sanctions are equivalent in terms of optimal deterrence.

activities). We show how both citizens' expectation about social harm, on the one hand, and the divergence between public agent's belief and citizens' one on the other hand, shape the timing and level of sanctions at equilibrium, under electoral competition.

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